

Remote Sensing Applications for Environmental Analysis in Transportation Planning: Application to the Washington State I-405 Corridor

Elizabeth Lanzer – Washington State Department of Transportation <u>LanzerE@wsdot.wa.gov</u>

Demin Xiong, PhD. – Oak Ridge National Laboratory Xiong D@ornl.gov

Partners

- Washington State Dept. Of Transportation (WSDOT)
- Oak Ridge National Lab (ORNL)
- Space Imaging Corporation
- Erdas, Inc.
- Puget Sound Regional Council
- Wisconsin Dept. Of Transportation
- Environmental Protection Agency (EPA)

The Need for This Work

- Transportation needs are immediate.
- *Environmental issues are complex.
- ❖ Timing is right.
- Technology has become available and (probably) affordable.



Proposed Work

Use remote sensing technologies and available data to develop methods and tools to create data meeting NEPA requirements for programmatic corridor environmental impact statements in a highly urbanized region. Compare resulting effort to traditional methods and evaluate for use in future programs, and develop guidelines for other DOTs to evaluate opportunities for using this approach in NEPA.

The I-405 Corridor

Highly urbanized:

Narrow, north-south band between mountains and lake

Transportation politics: 2nd worst traffic in the nation and now seen as a deterrent to economic development





The I-405 Corridor

Estimated that current 1.5 hour commute will be a 6 hour commute by 2020.

South King County along I-405 was fastest growing area in state (39.5% since 1990)

WSDOT

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The I-405 Transportation Program

A corridor development program that includes over 150 individual projects.

The Corridor EIS is about to be finalized. Traditional methods were used to develop discipline reports (Noise, Air, Endangered Species, Geology, Cultural Resources, Recreation, etc.).



Complex Environmental Issues

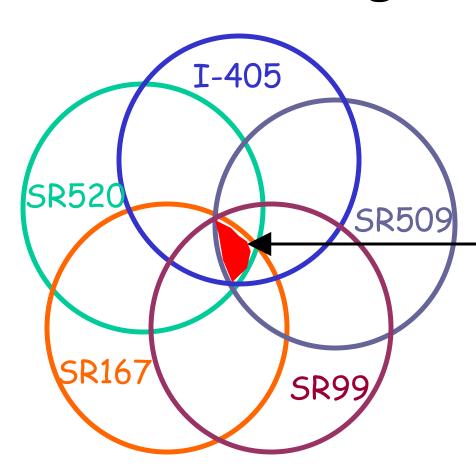
Operate under some of the heaviest state and local environmental regulations in the nation.

Remaining undeveloped areas mostly protected (parks, watersheds, etc.)

Newly developed areas create wildlife interface problems

Watershed is provides habitat for ESA listed salmon species

Timing is Right



Other similar programs in this urban area are being initiated. Together with I-405, these 5 projects comprise 50% of agency 10 year program - \$7.9b.

Overlapping Needs:

- ·Mitigation Planning
- ·Impact Assessment
- Interagency Coordination

State Legislature passed groundbreaking bill mandating environmental process streamlining for transportation projects

Available and Affordable Technologies

Regional data coordination efforts producing:

- *WA Remote Sensing Data Consortium
- *Puget Sound LIDAR Consortium
- Washington State Spatial Data Framework
- *Pacific Salmon Information Network

Proposed Work

Investigate application of remote sensing technology and methods that can provide relevant land use land cover (LULC) to several NEPA disciplines.

Compare the cost, timeliness and quality of remote sensing based products to traditional methods and assess the benefits and added value.

Work Plan

Task 1: Field Study

Task 2: Data Collection

Task 3: Image Processing and LULC

Classification

Task 4: Data Analysis and Presentation

Task 5: Cost Benefit Analysis and

Applicability Assessment

Task 6: Final Documentation and

Technology Transfer

Field Study

Phase I - Prior to image classification. Collect ground truth data for training LULC classification processing.

LULC classifications will be the focus of field work, not social or historic features.



Field Study

Phase II - After preliminary image classification. Verify and accuracy assess classified LULC information product.



Data Collection

Acquire, re-format and transfer available digital spatial data on study area.

- ✓ Landsat 7 imagery
- ✓ Ikonos Imagery
- ✓ DEMs / LIDAR
- ✓ custom color orthophotography
- ✓ GIS thematic layers for natural and built environment
- ✓ Other available data

Image Processing and Analysis

Combine image and elevation data resources to find best methods to create LULC and derivative information themes.

Develop methods for data fusion procedures to apply and augment currently available tools.

Data Analysis and Presentation

Integrate GIS themes to develop final spatial database and apply to NEPA.



Cost-Benefit Analysis and Applicability Assessment

Compare costs of image processing methods with traditional costs.

Evaluate effectiveness of information product (quality and timeliness).

Final Documentation and Technology Transfer

- Document methods used to create deliverable data and software.
- Share results at national workshop on remote sensing for NEPA.
- Prepare final cost-benefit evaluation report on applicability of remote sensing based information versus traditional ways.
- Transfer technology and train WSDOT to use methods.
- Review by WisDOT, Erdas and EPA

Deliverables

- Guidelines for deriving classified LULC for use in programmatic NEPA analysis from mixed remote sensing data.
- Software procedures to derive LULC and third generation information layers
- Cost benefit analysis of remote sensing methods versus traditional approaches.